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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

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51
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19980019457

Structure and conformation of photosynthetic pigments and related compounds. 10. Comparison of a phytochlorin and phytoporphyrin derived from chlorophyll a

Senge, Mathias O., Freie Universitaet Berlin, Germany; Smith, Kevin M.; Acta Crystallographica, Section C: Crystal Structure Communications; September 15, 1997; ISSN 0108-2701; Volume C53, Pt 9, pp. 1314-1318; In English; Copyright; Avail: Issuing Activity

The crystal and molecular structures of 17-decarboxy-ethyl-13(sup 1)-deoxo-17-propylphytochlorin, C(sub 33)H(sub 40)N(sub 4), (1), and phytoporphyrin methyl ester, C(sub 34)H(sub 36)N(sub 4)O(sub 3), (2), are compared. Compound (1) shows structuraters similar to those of other naturally occurring phytochlorins. Owing to the absence of any heteroatom functionalities at the periphery, no close contacts are observed in the packing of (1), in contrast to those normally found in other chlorophyll derivatives. Compound (2) presents the first structure of a free-base pheoporphyrin and forms chains stabilized by C-H(center-dot)(center-dot)(center-dot) O double bond C and pi - pi interactions. In contrast to the structure of (1) and other , the two pyrrole H atoms in (2) are located at rings B and D.

Author (EI)

Pigments; Nitrogen Compounds; Esters; Atomic Structure; Crystal Structure

19980019500 NASA Ames Research Center, Moffett Field, CA USA

Spectral Changes in Metal Halide and High-Pressure Sodium Lamps Equipped with Electronic Dimming

Bubenheim, David L., NASA Ames Research Center, USA; Sargis, Raman, Bionetics Corp., USA; Wilson, David, Bionetics Corp., USA; HortScience; Aug. 1995; Volume 30, No. 5, pp. 1086-1089; In English

Contract(s)/Grant(s): RTOP 199-61-12-20

Report No.(s): NASA/TM-95-207220; NAS 1.15:207220; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Electronic dimming of high-intensity discharge lamps offers control of Photosynthetic Photon Flux (PPF) but is often characterized as causing significant spectral changes. Growth chambers with 400-W Metal Halide (MH) and High-Pressure Sodium (HPS) lamps were equipped with a dimmer system using Silicon-Controlled Rectifiers (SCR) as high-speed switches. Phase control operation turned the line power off for some period of the alternating current cycle. At full power, the electrical input to HPS and MH lamps was 480 W (root mean squared) and could be decreased to 267 W and 428 W, respectively, before the arc was extinguished. Concomitant with this decrease in input power, PPF decreased by 60% in HPS and 50% in MH. The HPS lamp has characteristic spectral peaks at 589 and 595 nm. As power to the HPS lamps was decreased, the 589-nm peak remained constant while the 595-nm peak decreased, equaling the 589-nm peak at 345-W input, and 589-nm peak was almost absent at 270-W input. The MH lamp has a broader spectral output but also has a peak at 589 nm and another smaller peak at 545 nm. As input power approached 428 W, the 589-nm peak shifted to 570 nm. While the spectrum changed as input power was decreased in the MH and HPS lamps, the phytochrome equilibrium ratio (P(sub ft):P(sub tot)) remains unchanged for both lamp types.

Author

Metal Halides; High Pressure; Sodium; Luminaires; Dimming

19980020216

Microscale NO(sub 3)(-) biosensor for environmental applications

Larsen, Lars Hauer, Univ. of Aarhus, Denmark; Kjaer, Thomas; Revsbech, Niels Peter; Analytical Chemistry; September 01, 1997; ISSN 0003-2700; Volume 69, no. 17, pp. 3527-3531; In English; Copyright; Avail: Issuing Activity

A biosensor for NO(sub 3)(-) containing immobilized denitrifying bacteria and a reservoir of liquid growth medium for the bacteria was constructed. The bacteria did not have a N(sub 2)O reductase and therefore reduced NO(sub 3)(-) to N(sub 2)O, which was then subsequently quantified by a built-in electro-chemical transducer for N(sub 2)O. The only agents interfering with the determination of NO(sub 3)(-) were NO(sub 2)(-) and N(sub 2)O. The sensitivity for NO(sub 2)(sup -) was identical to the one for NO(sub 3)(-) whereas the sensitivity for N(sub 2)O was 2.4 times higher than for NO(sub 3)(-). Diffusive supply of electron donors to the bacteria from the built-in reservoir of growth medium ensured that the biosensor could work for 2-4 days. The tip diameter was down to 20 micron, and the sensors exhibited perfectly linear responses to nitrate in both freshwater and seawater. The detection limit was approx. 1 mu M. The 90% response time to changes in NO(sub 3)(-) concentration was from 15 to 60 s at room temperature and about twice that at 6 C, which was the lowest temperature for successful operation. The new NO(sub 3)(-) biosensor is a very useful tool for the study of nitrogen metabolism in nature.
Author (EI)
Bioinstrumentation; Nitrates; Environmental Engineering; Bacteria; Kinetics

19980020217
Microchip device for performing enzyme assays
Hadd, Andrew G., Oak Ridge Natl. Lab., USA; Raymond, Daniel E.; Halliwell, John W.; Jacobson, Stephen C.; Ramsey, J. Michael; Analytical Chemistry; September 01, 1997; ISSN 0003-2700; Volume 69, no. 17, pp. 3407-3412; In English; Copyright; Avail: Issuing Activity

A microfabricated device, called microchip, is developed to perform enzyme assay. Precise concentrations of substrate, enzyme, and inhibitor are mixed in nanoliter volumes using electrokinetic flow. Reagent dilution and mixing are controlled by regulating the applied potential at the terminus of each channel, using voltages derived from an equivalent circuit model of the microchip. The enzyme beta -galactosidase (beta -gal) is assayed using resorufin beta -D-galactopyranoside. Reaction kinetics are obtained by varying the concentration of substrate on-chip and monitoring the production of resorufin using laser-induced fluorescence. Derived Mechaelis-Menten constants compare well between an on-chip and a conventional enzyme assay.
EI
Chips (Electronics); Michaelis Theory; Reaction Kinetics; Assaying; Enzymes; Microelectronics

19980020287
Graphite - poly(tetrafluoroethylene) composite enzyme electrodes as suitable biosensors in predominantly nonaqueous media
Ortiz, Gemma, Complutense Univ. of Madrid, Spain; Gonzalez, M. Cristina; Reviejo, A. Julio; Pingarron, Jose M.; Analytical Chemistry; September 01, 1997; ISSN 0003-2700; Volume 69, no. 17, pp. 3521-3526; In English; Copyright; Avail: Issuing Activity

The performance of a graphite-poly(tetrafluoroethylene) Teflon composite amperometric ferrocyanide-mediated peroxidase electrode in a predominantly nonaqueous medium such as reversed micelles is discussed and compared with the behavior in a medium formed by acetonitrile/water. The composite electrode was constructed by purely physical entrapment of both the enzyme and the mediator into the bulk of the graphite-Teflon matrix with no need of covalent attachments. This biosensor responds rapidly to the changes in the concentration of both hydrogen peroxide and 2-butanone peroxide in reversed micelles formed with ethyl acetate, 0.1 mol L(sup -1) dioctyl sulfosuccinate as the surfactant, and a 4% phosphate buffer (pH 7.4) as the dispersed phase. The electrode shows a long-term operation due to the renewability of its surface. Moreover, reproducible responses are obtained with different electrodes fabricated from different composite matrixes. No significant loss of the enzyme activity is observed after four months of dry storage at 4 C of the composite electrode.
EI
Ethyl Compounds; Enzymes; Electrochemistry; Electrodes; Graphite; Polytetrafluoroethylene; Colloids

19980020357
Biopharmaceutical construction, costs, and cost controls
Law, Christopher, Curie & Brown Inc., USA; Cost Engineering (Morgantown, West Virginia); September, 1997; ISSN 0274-9696; Volume 39, no. 9, pp. 37-41; In English; Copyright; Avail: Issuing Activity

A description of the costs and cost control methodology used in a recent biopharmaceutical construction project in Pennsylvania is presented. The project is a 3-level space with a mezzanine between the basement and first floor. There is approximately 151,000 ft(sup 2) of floor area and 38,000 ft(sup 2) of production area. Construction began on April 1, 1995, with a soil stabilization program. Scheduled substantial completion was for November 27, 1996; mechanical completion was achieved on December

6, 1996. Punchlist work was completed on May 1997. Final design was around 10 percent complete on April 1, 1995, making this by definition a 'fast track' project. Special factors that may influence costs for this type of construction project are also presented.
EI
Project Management; Cost Effectiveness; Pert; Critical Path Method; Management Planning

19980020632 Cincinnati Univ., OH USA
Genetic Exchange Between Mutant Strains of Sulfolobus acidocaldarius: Analysis, Applications, and Significance for Hyperthermophiles ***Final Report, 1 Apr. 1994 - 31 Aug. 1997***
Grogan, Dennis W., Cincinnati Univ., USA; Oct. 20, 1997; 6p; In English
Contract(s)/Grant(s): N00014-94-I-0393
Report No.(s): AD-A331605; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

A prokaryotic micro-organism originally isolated from terrestrial hot springs, Sulfolobus acidocaldarius, was studied for its ability to exchange and recombine segments of its chromosome. Mutant strains were isolated and used to quantitatively assay this process. The genetic exchange was found to be a form of conjugation that differs from bacterial conjugation with respect to the symmetry of DNA transfer and other properties. Other fundamental genetic phenomena of prokaryotes from geothermal habitats were studied for the first time using acidocaldarius; these included photoreactivation, UV-induced mutagenesis, and stimulation of genetic exchange by UV. The rate of spontaneous mutation was measured at 75 degrees C in S. acidocaldarius and was found to be nearly the same as that of the bacterium Escherichia coli at 37 degrees C. This provided the first evidence that the archaea which populate geothermal habitats can maintain genetic fidelity even at extremely high temperatures The basic information gained in these studies portrays the microbial inhabitants of thermal environments in a new light, suggesting that they may mutate infrequently in nature but may exchange genes at a significant rate.
DTIC
Chromosomes; Conjugation; Deoxyribonucleic Acid; Prokaryotes; Stimulation; Symmetry; Microorganisms

19980020869 Marine Biological Lab., Woods Hole, MA USA
Woods Hole Workshop on Computational Neuroscience ***Final Report, 1 May 1996 - 30 Apr. 1997***
Sejnowski, Terrence J., Marine Biological Lab., USA; Dec. 19, 1997; 4p; In English
Contract(s)/Grant(s): N00014-96-I-0528
Report No.(s): AD-A333392; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The Woods Hole Workshop on Computational Neuroscience was held at the Marine Biological Laboratory on August 26 to August 31, 1996. Twenty-two investigators attended the workshop on the computational functions of nervous systems. The topics in computational neuroscience that were discussed included neural systems for learning and long term memory, non-classical responses of cortical neurons, and active perception. In addition, some members of the workshop lectured in the concurrent Computational Neuroscience Course at the Marine Biological Laboratory, and students taking the course were invited to attend the workshop. The Workshop was highly successful at bringing together experimentalists and computational neuroscientists for intense discussions at the forefront of computational neuroscience.
DTIC
Neurology; Computation; Conferences; Memory

19980021021
Electronic interactions in photosynthetic light-harvesting complexes: The role of carotenoids
Scholes, Gregory D., Imperial Coll. of Science, Technology and Medicine, UK; Harcourt, Richard D.; Fleming, Graham R.; Journal of Physical Chemistry B; September 11, 1997; ISSN 1089-5647; Volume 101, no. 37, pp. 7302-7312; In English; Copyright; Avail: Issuing Activity

The origin and distance dependence of the electronic interactions which promote energy transfer within photosynthetic light-harvesting complexes is investigated. A model based on localized molecular orbitals is related to canonical molecular orbital calculations, therefore demonstrating its practical utility and allowing us to interpret the results of CAS-SCF calculations of the coupling between donor-acceptor pairs. We then focus on the mechanism of energy transfer involving the carotenoid 2(sup 1)A(sub g) (S(sub 1)) electronic state: [carotenoid (2(sup 1)A(sub g)) (Car) to carotenoid (2(sup 1)A(sub g))] and [carotenoid (2(sup 1)A(sub g)) to bacteriochlorophyll (Q(sub y)) (BCHl)] interactions. The Car-Car cou found to involve reasonably long-range interaction terms, with a primary contribution from dispersion-type interactions, which have an R(sup 6) distance dependence. The primary contributor to the Car-BCHl S(sub 1)yields S(sub 1) energy transfer mechanism is suggested to be proportional to the product of dipole-dipole and polarization interactions. In neither case does the electronic interaction resemble the Dexter exchange integral in origin or distance dependence. Some model CAS-SCF calculations of electronic interactions in

2,4,6-octatriene dimers are presented which support the predictions of the theory: the calculated interaction is found to be (i) small in comparison to the overlap-dependent triplet-triplet interaction at close separations; (ii) small in comparison to a dipole-dipole (S(sub 2)) interaction at all separations; and (iii) quite weakly distance dependent at larger separations. The implications for the role of carotenoids in photosynthetic light-harvesting complexes are discussed.
Author (EI)
Molecular Orbitals; Energy Transfer; Molecular Structure; Photosynthesis; Mathematical Models; Computation

19980021084
TEM moire patterns explain STM images of bacteriophage T5 tails
Guenebaut, V., European Molecular Biology Lab., Germany; Maaloum, M.; Bonhivers, M.; Wepf, R.; Leonard, K.; Hoerber, J. K. H.; Ultramicroscopy; September, 1997; ISSN 0304-3991; Volume 69, no. 2, pp. 129-137; In English; Copyright; Avail: Issuing Activity

A subtle combination of constant current and constant height modes in scanning tunnelling microscopy allowed the imaging of a non-flat uncoated biological specimen, namely the tail of the bacteriophage T5. In parallel, a reference three-dimensional structure of the T5 tail was calculated from cryo-transmission electron microscopy images, based on its helical symmetry. This three dimensional reconstruction was compared with scanning tunnelling microscopy data. The images of the tail obtained by transmission electron microscopy, as well as projections of the reconstructed model, show similar moire patterns. Here we show that scanning tunnelling microscopy performed in an aqueous environment provides direct images which are remarkably similar to the projection of the three dimensional model obtained by transmission electron microscopy. We deduce that our scanning tunnelling microscopy images are the result of a transmission of electrons through the gap between the scanning tip and the conductive support across biological specimen.
Author (EI)
Bacteriophages; Transmission Electron Microscopy; Scanning Electron Microscopy; Energy Gaps (Solid State); Scanning Tunneling Microscopy

19980021285 Maryland Univ., School of Medicine, Baltimore, MD USA
Role of Accessory Molecule(s) in Endotoxin-Endothelial Interactions and Endothelial Barrier Dysfunction ***Annual Report, 1 Jun. 1996 - 31 May 1997***
Goldblum, Simeon E., Maryland Univ., USA; Jul. 1997; 18p; In English
Contract(s)/Grant(s): DAMD17-94-J-4117
Report No.(s): AD-A331555; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We have studied the direct impact of endotoxin or bacterial lipopolysaccharide (LPS) on pulmonary vascular endothelial cell (EC) barrier function. We have found that LPS induces (1) tyrosine phosphorylation of a 65kDa protein, paxillin, (2) actin disassembly, and (3) opening of the paracellular pathway. The tyrosine phosphorylation events were clearly prerequisite to the downstream events of actin depolymerization, opening of the paracellular pathway, and loss of endothelial barrier function.
DTIC
Endotoxins; Pulmonary Functions; Proteins; Phosphorylation; Tyrosine

19980021436
The effect of ligation of trachea on severity of lung injury caused by airblast
Zhang, Jun-kui, 3rd Military Medical Univ., China; Wang, Zheng-guo, 3rd Military Medical Univ., China; Leng, Hua-guang, 3rd Military Medical Univ., China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 83-85; In Chinese; Copyright; Avail: Aeroplus Dispatch

A single attack of airblast negative pressure was produced with a rapid decompression simulator onto each of 36 rabbits to observe the effect of ligation of trachea on the severity of lung injury caused by the blast. The results showed that the blast trauma is aggravated by the ligation and the gross pathological changes consist of hemorrhage and edema in different degrees. The lung injury in the trachea ligation group is characteristic in pulmonary bullae and disruption. A discussion on injury mechanism of the pulmonary trauma of airblast follows.
Author (revised by AIAA)
Aerial Explosions; Lungs; Injuries; Trachea

19980021440

Effects of hypoxia and adaptation to hypoxia on calmodulin content and calcium/calmodulin-dependent protein kinase II activity

Xie, Yin-zhi, Academy of Military Medical Sciences, Inst. of Hygiene and Environmental Medicine, China; Sun, Xiang-bin, Academy of Military Medical Sciences, Inst. of Hygiene and Environmental Medicine, China; Fan, Ming, Academy of Military Medical Sciences, Inst. of Hygiene and Environmental Medicine, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 65-67; In Chinese; Copyright; Avail: Aeroplus Dispatch

The changes of active-calmodulin (CaM) content and calcium/CaM dependent protein kinase II (CaMPK II) activity in cerebral cortices of rats during acute hypoxia and adaption to hypoxia were investigated. Thirty rats were randomly divided into three groups: an acute hypoxia group, an adaptation to hypoxia group, and a normoxic control group. The results showed that the CaM fluorescence density was 46.1 +/- 5.0 in the control group, 40.0 +/- 4.6 in the acute hypoxia group, and 52.91 +/- 5.7 in the adaptation to hypoxia group respectively. The CaM content decreased significantly in the acute hypoxia group and increased significantly in the adaptation to hypoxia group as compared to control group. The CaM-PK II activity in the supernatant of brain extract was 198.2 +/- 9.4 in the control group, 184.3 +/- 8.1 in acute hypoxia group and 192.8 +/- 49.7 in adaptation to hypoxia group. The CaM-PK II activity in the acute hypoxia group was significantly lower than that in the other two groups.
Author (revised by AIAA)

Hypoxia; Adaptation; Calcium Metabolism; Physiological Responses; Altitude Acclimatization

19980021463

Effect of traditional Chinese herb medicine on hemorrheological parameters in rabbits simulating 0 gravity.

Xiang, Qiu-lu, Inst. of Space Medico-Engineering, China; Shen, Xian-yun, Inst. of Space Medico-Engineering, China; Meng, Jing-rui, Inst. of Space Medico-Engineering, China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 146, 147; In Chinese; Copyright; Avail: Aeroplus Dispatch

This study explores the prospects of application of traditional Chinese herbal medicine for improving blood circulation during space flight. In this experiment, 55 rabbits were divided into 4 groups: a control group (I), suspension group (II), Chuan Qiong (Rhizoma Ligustici) + suspension group (III), and Dan Huang (Saliva miltiorrhiza and astragulus root) + suspension group (IV). The rabbits of the latter 3 groups underwent 20-degree head down tilt for 7 days. The changes of hemorrheological parameters before and after 7 days of experiment were compared. The results show that both Chuan Qiong and Dan Huang can improve the hemorrheological parameters of the rabbits that underwent head down suspension, the blood viscosity. Hct, fibrinogen, and red cell aggregative index in group III and group IV were significantly lower than those in group II, and some parameters did not differ significantly from those of I. This suggests that Chinese herb medicine may play some protective role during space flight.
Author (revised by AIAA)

Space Flight Stress; Plants (Botany); Drugs; Gravitational Physiology; Head Down Tilt; Hemodynamic Responses

19980021464

Effect of anti-free-radical-agents on brain mitochondrial lipid peroxidation and cellular metabolism in rats under + Gz stress

Zhan, Hao, Chinese Air Force, Inst. of Aviation Medicine, China; Xin, Yi-mei, Chinese Air Force, Inst. of Aviation Medicine, China; Liu, Ren-fu, Chinese Air Force, Inst. of Aviation Medicine, China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 141-145; In Chinese; Copyright; Avail: Aeroplus Dispatch

Male rats were randomly divided into 5 groups (each with n = 8), a control group, A (+1 Gz), and groups B,C,D,E to be exposed to +10 Gz stress, and administered before the exposure in 3 consecutive days with various agents, including anti-free-radical-agent (AFRA), oxygen-centered free radical spin trapper, vitamin E, and iron chelator). The +10 Gz exposure lasted for 3 min each time, with 40 min interval in between, altogether 3 sessions. The rats were decapitated 40 min after the third run of exposure, and the results were compared with those of group A. The results show that repeated +10 Gz exposure enhance significantly the lipid peroxidation and inhibited cellular metabolism while AFRA can decrease these and increase significantly brain ATPase and lactate dehydrogenase activity, maintain the normal Na(+), K(+) concentration in brain tissue. AFRA, especially deferoxamine, also alleviate the brain ultrastructural injury. These results support the hypothesis that oxygen free radical might play an important role in Gz-induced brain injury.
Author (revised by AIAA)

Brain; Mitochondria; Lipid Metabolism; Acceleration Stresses (Physiology); Free Radicals; Antioxidants

19980021817

Experimental study of alterbaric vertigo in guinea pigs

Zheng, Gang, Chinese Air Force, China; Li, Wei-dong, Chinese Air Force, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 86-89; In Chinese; Copyright; Avail: Aeroplus Dispatch

Albino guinea pigs were exposed to change of atmospheric pressure in a altitude chamber with an ascending rate 20 m/s up to 5000 m and a descending rate 100 m/s down to the ground. Their vestibulo-somatic responses were observed and spontaneous nystagmus were recorded immediately after the exposure. Twenty-four guinea pigs revealed positive signs of alterbaric vertigo during ascending. Abnormal ENG could be recorded from some guinea pigs 5 hrs, 3 days, and 15 days after the exposure; pathological changes included hemorrhage in perilyphatic space of vestibular organs and injury of hair of sensory cells. The recovery of ENG came earlier than morphological changes. The damage was mostly reversible. The pathogenic mechanism of alterbaric vertigo is discussed.

Author (revised by AIAA)

Vertigo; Pressure Oscillations; Vestibular Nystagmus; Injuries

19980021818

The effect of acute hypoxia on serum level of endogenous digitalis-like factor in rats

Zhou, Zheng-mo, Naval General Hospital, China; Sun, A-cheng, Naval General Hospital, China; Yu, Song-hai, Naval General Hospital, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 68, 69; In Chinese; Copyright; Avail: Aeroplus Dispatch

The content of serum endogenous digitalis-like factor (EDLS) was measured by radioimmuno-precipitation assay in 30 Wistar rats after staying at 7500 m for 30 min in an altitude chamber and in other 30 rats as controls. The results show that the serum EDLS level in experimental group is significantly lower than that in control group. Thus it is seen that acute hypoxia affects the synthesis/release of EDLS in the body. This finding might be of help in explaining the aggravation of cardiac symptoms in cor pulmonale during dyspnea and in regulating the dosage of digitalis.

Author (revised by AIAA)

Hypoxia; Digitalis; Altitude Acclimatization; Physiological Responses

19980022125

The effect of acute hypobaric hypoxia on the lipid peroxidation of liver tissue and the hepatic function

Hao, Wei-wei, Naval General Hospital, China; Yang, Ye, Naval General Hospital, China; Yu, Qi-fu, Naval General Hospital, China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 135-137; In Chinese; Copyright; Avail: Aeroplus Dispatch

Acute hypobaric hypoxic experiment was carried out on 32 healthy and full grown Wistar rats to detect the change in the hepatic lipid peroxidation and the hepatic function. The results showed that hepatic function changed noticeably after acute hypoxia exposure. Lactic dehydrogenase (LDH), alanine transaminase (ALT), and gamma-glutamyl-transpeptidase (gamma-GT) increased significantly while alkaline phosphatase (ALP) did not. The activity of selenium glutathione peroxidase (SeGSHPx) in liver homogenate decreased significantly, and melondialdehyde (MDA), did not; thus, SeGSHPx/MDA ratio decreased significantly. The results suggest that, after acute hypoxia, hepatic lipid peroxidation does not change significantly; only the potential hepatic anti-oxidation ability drops.

Author (revised by AIAA)

Hypoxia; Lipid Metabolism; Oxidation; Liver; Pathological Effects

19980022126

Effect of acute hypoxia on 5-HT and 5-HIAA levels in blood and brain tissue of mice

Yi, Chang-rong, Chinese Air Force, Inst. of Aviation Medicine, China; Yu, Hong, Chinese Air Force, Inst. of Aviation Medicine, China; Zhang, Mei-fang, Chinese Air Force, Inst. of Aviation Medicine, China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 132-134; In Chinese; Copyright; Avail: Aeroplus Dispatch

Eighty male mice (weighted 20-25 g) were randomly divided into 8 groups (n = 10 each). Group 1 served as control. Groups 2-4 were exposed to 3000, 5000, and 8000 m, respectively, in a hypobaric chamber for 30 min and, after anesthesia, were decapitated immediately after exposure. The contents of 5-hydroxytryptamine (5-HT) and 5-hydroxyindoleacetic acid (5-HIAA) in blood and brain tissue were determined. As for groups 5-8, after exposure to 5000 m for 30 min, group 5 was tested for 5-HT and 5-HIAA immediately, group 6, 7, and 8 were tested 1, 2, and 4 h after exposure, respectively. The results indicate that a decrease of 5-HT and 5-HIAA after exposure to hypoxia does not relate significantly to the exact altitude, but over the time elapsed, 2 h

after exposure, the 5-HT and 5-HIAA in blood tend to increase again, though not significantly; the recovery process is quicker in blood than in brain tissue.
Author (revised by AIAA)
Hypoxia; Blood; Brain; Physiological Responses; Serotonin

19980022127
Observation on myocardial ultrastructure together with endothelin detection after moderate acute hypoxia
Yu, Qi-fu, Naval General Hospital, China; Yang, Ye, Naval General Hospital, China; Guan, Ying-peng, Naval General Hospital, China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 129-131; In Chinese; Copyright; Avail: Aeroplus Dispatch

The myocardial ultrastructure in 14 Wistar rats was observed with an electron microscope after moderate acute hypoxia. Another 14 Wistar rats served as control group. It was seen that changes of myocardial ultrastructure were prominent after acute hypoxia, including pyknosis, swelling and vacuolation of mitochondria, the disarrangement of myofibrils, breakage of myomeres, disappearance of rough endoplasmic reticula, margination of nuclear chromatin, and perinuclear proteolysis. These changes might be the main pathological basis of myocardial functional attenuation. In addition, endothelin content in plasma increased significantly after acute hypoxia, suggesting that endothelin possibly plays an important role in myocardial ultrastructural change.
Author (revised by AIAA)
Hypoxia; Pathological Effects; Myocardium; Cytology; Heart Function

19980022708 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Heavy Metal Toxicity in Bioremediation: Microbial Cultures and Microscopy
Goodbody, Jason B., Air Force Inst. of Tech., USA; Dec. 1997; 122p; In English
Report No.(s): AD-A334345; AFIT/FEE/ENV/97D-06; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This research employed a variety of microscopy and spread plating techniques to observe the effects of heavy metal treatments on a toluene-selected bacterial population. Microbial colonies were cultured on spread plates and the resulting numbers were compared to respiration data. The mechanisms of reproduction were demonstrated to be more sensitive to metal treatments than were the mechanisms of respiration. Phase contrast, fluorescent microscopy, were used to compare and document a wide variety of bacteria resulting from different metal treatments as well as from environmental changes within the source bioreactor. The removal of sensitive bacteria and the selection of metal tolerant species resulting from metal treatments was observed. Species that were initially unobserved within the bioreactor appeared dominate when competing types of bacteria were removed and more agreeable environmental conditions were present. The use of fluorescent stains to differentiate between live and dead bacteria when treated with heavy metals proved to be impractical as the bacteria exhibited auto-fluorescence. Such new findings, however, did aid in the characterization of different types of bacteria and offered new techniques for potential heavy metal toxicity measurements as well as differentiation methods.
DTIC
Heavy Elements; Toxicity; Metals; Fluorescence

19980022779
Mass-loading sensitivity of acoustic Love wave biosensors in air
Ogilvy, J. A., Univ. Coll. London, UK; Journal of Physics D: Applied Physics; September 07, 1997; ISSN 0022-3727; Volume 30, no. 17, pp. 2497-2501; In English; Copyright; Avail: Issuing Activity

The theoretical mass-loading sensitivity of Love wave biosensors composed of thin layers of SiO(sub 2) on ST-cut quartz is compared with measured sensitivities. The comparison presented here was prompted by earlier results in which theoretical predictions showed reasonable agreement for the mass-loading sensitivity, over a limited range of SiO(sub 2) layer thicknesses, but were unable to predict the velocities of the Love waves, and could not reproduce the rapid loss of sensitivity as the layer thickness increased beyond its optimum value. In the earlier work, the theory was based on wave propagation in isotropic, non-piezoelectric, layered materials, combined with perturbation theory to predict the effect on wave velocity of a thin, solid, mass-loading layer. We therefore wished to determine whether the previous discrepancies between theory and experiment arose because of the use of isotropic theory to describe the material properties of the layers. Further theory was therefore performed, in which the anisotropic and piezoelectric nature of the layers was included. We show in this paper that the full theory gives an improved prediction of the velocities of the guided Love waves, again predicts the trend in the variation of mass-loading sensitivity with SiO(sub 2) layer thickness, measured using sputtered gold as the mass-loading layer, and correctly predicts the optimum layer thickness at which maximum sensitivity occurs. However, the theory underestimates the maximum sensitivity and again does not predict the rapid decrease in sensitivity beyond this maximum. The reason for this discrepancy is still, therefore, unclear. One possible

explanation, that electrical effects were partially responsible for the frequency changes recorded in the experiments, is discounted as the fuller theory shows that any such effects should be negligible for the Love waves being considered. We conclude that a theory based on a homogeneous guiding layer perfectly adhered to a piezoelectric substrate is not adequate to describe the measured sensitivities of the Love wave devices.
Author (EI)
Love Waves; Sound Waves; Bioinstrumentation; Silicon Dioxide; Quartz; Wave Propagation; Electric Fields

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19980020642 Army Foreign Science and Technology Center, Charlottesville, VA USA
WRAIR GOCO Blood Research Detachment's Red Blood Cell Storage Laboratory ***Annual Report, 21 Sep. 1996 - 20 Sep. 1997***
Lippert, Lloyd E., Army Foreign Science and Technology Center, USA; Oct. 1997; 43p; In English
Contract(s)/Grant(s): DAMD17-94-C-4154
Report No.(s): AD-A331556; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Bionetics Corporation staffed and maintained a research laboratory to support red blood cell preservation research at the Blood Research Detachment of the Walter Reed Army Institute of Research, 1413 Research Boulevard, Rockville, MD 20850. Contract staff completed data collection on two clinical trials evaluating candidate red cell preservation systems intended for eight week storage. Preliminary data evaluation showed that neither the hypotonic storage medium system tested in the first trial nor the prestorage leukocyte reduction system evaluated in the second trial met the FDA criterion of at least 75% twenty four hour post transfusion red blood cell survival at the end of eight weeks of storage. We initiated a third clinical trial to evaluate the effects on red cell survival of twenty-four hours at room temperature either early or late in the storage of AS-5 preserved red cells. We also completed an in vitro study evaluating the effect of warming both early and late in storage of CPDA-1 preserved red cells. Warming for twenty-four hours at 25 deg C appears to accelerate the storage lesion equivalent to a week in the refrigerator. The Bionetics Corporation advanced the Blood Research Detachment's mission.
DTIC
Erythrocytes; Storage; Research

19980020677 North Carolina State Univ., Dept. of Toxicology, Raleigh, NC USA
Steroid Hydroxylase Activities as Noninvasive Biomarkers of Toxicant Exposure and Effect ***Final Report***
Leblanc, Gerald A., North Carolina State Univ., USA; Oct. 1997; 45p; In English
Contract(s)/Grant(s): F49620-94-I-0266; AF Proj. 2312
Report No.(s): AD-A334730; AFRL-SR-BL-TR-98-0040; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Biomarkers of chemical exposure and effect have substantial utility in chemical hazard and risk assessments. The overall goal of this research project was to test the hypothesis that changes in the metabolic elimination of the steroid hormone testosterone could serve as a non-invasive biomarker of toxicant exposure and effect in a variety of sentinel species and humans.
DTIC
Hazards; Exposure; Risk; Chemical Effects; Hormones; Steroids

19980020924 Army Aeromedical Research Lab., Fort Rucker, AL USA
The Effects of Melatonin on Menstrual Characteristics, Prolactin, and Premenstrual Syndrome-Like Symptoms during a Simulated Eastward Deployment ***Final Report***
Comperatore, Carlos A., Army Aeromedical Research Lab., USA; Oct. 1997; 66p; In English
Report No.(s): AD-A334061; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Melatonin (N-acetyl-5-methoxytryptamine),a natural hormone which has been shown to resynchronize circadian rhythms and induce sleep in humans (Arendt et al., 1987; Dawson and Encel, 1993; Reiter, 1991; Wurtman, 1986), is currently being marketed widely as a dietary supplement to alleviate desynchronosis (desynchronization of physiological and behavioral rhythms) and assist in obtaining quality sleep. Desynchronosis often results from rapid shifts in work schedules from day to night, or from shifts in the light-dark cycle due to time zone crossing. Symptoms resulting from desynchronosis include fatigue, sleepiness, lethargy, insomnia, gastrointestinal tract disorders, and poor mental performance (for review see Comperatore and Krueger, 1990). Melatonin therapy has been demonstrated to be effective in preventing sleep loss and in maintaining alertness following travel

across multiple time zones (Arendt and Broadway, 1987; Comperatore et al., 1996; Petrie et al., 1989). Thus, melatonin can be a potentially effective chronobiotic and ameliorate desynchronosis during travel.
DTIC
Circadian Rhythms; Sleep Deprivation; Desynchronization (Biology); Hormones

19980021299 NASA Ames Research Center, Moffett Field, CA USA
Noninvasive Determination of Bone Mechanical Properties using Vibration Response: A Refined Model and Validation in vivo
Roberts, S. G., Stanford Univ., USA; Hutchinson, T. M., NASA Ames Research Center, USA; Arnaud, S. B., NASA Ames Research Center, USA; Steele, C. R., Stanford Univ., USA; Kiratli, B. J., California Univ., USA; Martin, R. B., California Univ., USA; Journal of Biomechanics; 1996; ISSN 0021-9290; Volume 29, No. 1, pp. 91-98; In English
Contract(s)/Grant(s): RTOP 199-26-12-02; RTOP 106-30-43-04
Report No.(s): NASA/CR-96-207209; NAS 1.26:207209; Copyright Waived (NASA); Avail: CASI; A03, Hardcopy; A01, Microfiche

Accurate non-invasive mechanical measurement of long bones is made difficult by the masking effect of surrounding soft tissues. Mechanical Response Tissue Analysis (MRTA) offers a method for separating the effects of the soft tissue and bone; however, a direct validation has been lacking. A theoretical analysis of wave propagation through the compressed tissue revealed a strong mass effect dependent on the relative accelerations of the probe and bone. The previous mathematical model of the bone and overlying tissue system was reconfigured to incorporate the theoretical finding. This newer model (six-parameter) was used to interpret results using MRTA to determine bone cross-sectional bending stiffness, EI(sub MRTA). The relationship between EI(MRTA) and theoretical EI values for padded aluminum rods was R(exp 2) = 0.999. A biological validation followed using monkey tibias. Each bone was tested in vivo with the MRTA instrument. Postmortem, the same tibias were excised and tested to failure in three-point bending to determine EI(sub 3-PT) and maximum load. Diaphyseal Bone Mineral Density (BMD) measurements were also made. The relationship between E(sub 3-PT) and in vivo EI(sub MRTA) using the six-parameter model is strong (R(exp 2) = 0.947) and better than that using the older model (R(exp 2) = 0.645). EI(MRTA) and BMD are also highly correlated (R(exp 2) = 0.853). MRTA measurements in vivo and BMD ex vivo are both good predictors of scaled maximum strength (R(exp 2) = 0.915 and R(exp 2) = 0.894, respectively). This is the first biological validation of a non-invasive mechanical measurement of bone by comparison to actual values. The MRTA technique has potential clinical value for assessing long-bone mechanical properties.
Author
Bone Mineral Content; Bending; Density Measurement; Mechanical Properties

19980021322 NERAC, Inc., Tolland, CT USA
Health Information Systems. (Latest citations from the NTIS Bibliographic Database)
Jan. 1998; In English; Page count unavailable.
Report No.(s): PB98-851793; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the systems used to collect, process, analyze, and transmit information required for organizing and operating health services and for conducting research and training. Subject areas include health planning, education, statistics, and health care management. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Information Systems

19980021435
Enhancement of anti-G effect of L-1 maneuvering by strengthening of respiratory muscles in pilots
Wang, Shan-xiang, Chinese Air Force, China; Zhing, Jian-yin, Chinese Air Force, China; Geng, Xi-chen, Chinese Air Force, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 90-92; In Chinese; Copyright; Avail: Aeroplus Dispatch

The purpose of the present study was to look for a convenient, effective method to increase the anti-G effect of L-maneuvering. Thirty pilots underwent a three-week program of respiratory muscle strengthening exercise during their regular convalescence in sanatorium. The training achieved a 40.6 percent increase in maximal expiratory pressure (MEP) and 27.0 percent increase in maximal inspiratory pressure (MIP) at mouth, 132.6 percent increase in expiratory tolerance time and 137.8 percent increase in inspiratory tolerance time. L-1 maneuvering showed an increase of G tolerance by of 0.35 G and prolongation of sustained performance of L-1 maneuver by 80.8 s. The results indicated that the strengthening of respiratory muscles could enhance

the anti-G effect of L-1 maneuvering obviously. Our program of respiratory muscle strengthening exercise may be included into the aviation physiology training of pilots during their regular convalescence in sanitorium.
Author (revised by AIAA)
Muscular Function; Respiratory System; Aircraft Maneuvers; Acceleration Tolerance; Acceleration Protection

19980021437
Application of PDE for measuring left ventricular function during LBNP test
Hu, Su-wei, Inst. of Space Medico-Engineering, China; Zhao, Guo-xuan, Inst. of Space Medico-Engineering, China; Wang, De-han, Inst. of Space Medico-Engineering, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 78-82; In Chinese; Copyright; Avail: Aeroplus Dispatch

This paper aimed to probe the application value of pulse Doppler echocardiography (PDE) in lower body negative pressure (LBNP) test. Eleven healthy male volunteers twice underwent the same LBNP test with a time interval of 3-4 day. A protocol of four successive steps of LBNP was adopted: -2.7 kPa, 2 min; -4.0 kPa, 3 min; -5.3 kPa, 5 min; -6.7 kPa, 10 min. The following indexes can be calculated with the technique: acceleration time, ejection time, time of cardiac cycle, peak velocity (Vp) and average velocity of blood flow, time velocity integral (VI), stroke volume (SV), cardiac output (CO), left ventricular ejection force (LVEF), stroke work (SW), stroke power (SP), average positive acceleration, average negative acceleration. The results showed that a high lever of reliability of PDE values was obtained and that PDE can be used to measure the decline of cardiac function caused by LBNP.
Author (revised by AIAA)
Cardiac Ventricles; Heart Function; Lower Body Negative Pressure; Hemodynamic Responses

19980021438
Characteristics of cardiovascular autonomic nervous modulation in response to lower body negative pressure (LBNP)
Zheng, Jun, 4th Military Medical Univ., China; Zhang, Rong, 4th Military Medical Univ., China; Zhang, Li-fan, 4th Military Medical Univ., China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 74-77; In Chinese; Copyright; Avail: Aeroplus Dispatch

Ten healthy young men underwent -6.67 kPa LBNP in supine position for 20 min. In response to LBNP, the blood pressure decreased and heart rate increased significantly. Spectral analysis of heart rate variability (HRV) and blood pressure variability (BPV) showed that the low frequency component increased and the high frequency component reduced significantly. The results suggest that the characteristics of cardiovascular autonomic response to LBNP can be assessed by power spectral analysis specifically and sensitively. Further studies indicated that the sympathetic tone of peripheral blood vessels in subjects with poor tolerance to LBNP was lower than that of normal ones.
Author (revised by AIAA)
Lower Body Negative Pressure; Physiological Responses; Cardiovascular System; Autonomic Nervous System

19980021439
The characteristics of bubble formation in bile salts solution during altitude decompression
Zheng, Xiao-hui, Chinese Air Force, Inst. of Aviation Medicine, China; Li, Quan-zhen, Chinese Air Force, Inst. of Aviation Medicine, China; Zho, Ya-jun, Chinese Air Force, Inst. of Aviation Medicine, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 70-73; In Chinese; Copyright; Avail: Aeroplus Dispatch

Light reflection technique was used to detect the bubble formation in bile salts solution (BSS) quantitatively during altitude decompression. The results showed that the concentration of BSS, the altitude attained and rate of decompression had significant influence on the quantity and appearance time of bubbles. There was no bubble formation following decompression when the solution had been centrifuged or predecompressed. This indicates that bubbles will not form unless gas nuclei already exist in BSS. In addition, the results showed that bile salts have the ability to stabilize the gas nuclei in its solution and the bubbles formed following decompression. So bile salts may affect the occurrence of decompression sickness in vivo.
Author (revised by AIAA)
Pressure Reduction; Bubbles; Decompression Sickness; Aqueous Solutions; Gastrointestinal System

19980021461
Changes of the respiratory parameters in anti-G straining maneuvers.
Sun, Xi-qing, 4th Military Medical Univ., China; Wu, Xing-yu, 4th Military Medical Univ., China; Zhang, Li-fan, 4th Military Medical Univ., China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 151-153; In Chinese; Copyright; Avail: Aeroplus Dispatch

The changes of respiratory parameters in L-1, M-1 and M-1 (modified) maneuvering were studied in 8 male subjects at +1 Gz. The results show that the peak inspiratory flow rates in L-1, M-1 and M-1 (modified) without inflation of the anti-G suit were 315.9 +/- 37.3, 323.7 +/- 61.1, and 310.9 +/- 36.3 L/min, respectively, and with the anti-G suit inflated, 280.9 +/- 44.5, 282.0 +/- 53.7, and 315.5 +/- 48.4 L/min, respectively. The expiratory flow rates during L-1 maneuvering were elevated also. It is suggested that the oxygen supply equipment now in service cannot meet adequately the demands of performing anti-G straining maneuvers mentioned above.
Author (revised by AIAA)
Respiratory Physiology; Acceleration Stresses (Physiology); Respirometers; Acceleration Protection; Pressure Suits

19980021462
The characteristics of cardiovascular response to 70 deg head-up and -6 deg head-down tilt
An, Yin-dong, 4th Military Medical Univ., China; Miao, Jian-ting, 4th Military Medical Univ., China; Xu, Ge-lin, 4th Military Medical Univ., China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 148-150; In Chinese; Copyright; Avail: Aeroplus Dispatch

The cardiac pump function, systolic time intervals (STI), and related parameters were studied in 10 healthy male volunteers in changing from the 70 deg headup tilt (HUT) to -6 deg head-down tilt (HDT). The results show that heart rate (HR), diastolic blood pressure (DBP), mean arterial pressure (MAP), total peripheral resistance (TPR), ejection fraction (EF), stroke volume (SV), cardiac output (CO), cardiac index (CI), and STI all changed significantly, immediately and at 10 and 20 min after the subject changed from 20 min in 70 deg HUT to -6 deg HDT. The data obtained are quite similar to those in the literature, but the 20 min tilt used in this experiment (from 70 deg HUT to -6 deg HDT) might be much shorter an observation time to induce the changes up to this degree.
Author (revised by AIAA)
Cardiovascular System; Head Down Tilt; Hemodynamic Responses; Heart Function; Microgravity

19980021833
Effect of mild and moderate acute hypoxia on brain wave spectrum and performance.
Zhang, Jian-wei, Chinese Air Force, Inst. of Aviation Medicine, China; Jia, Yu-lan, Chinese Air Force, Inst. of Aviation Medicine, China; He, Deng-yan, Chinese Air Force, Inst. of Aviation Medicine, China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 138-140; In Chinese; Copyright; Avail: Aeroplus Dispatch

Ten male subjects were subjected to randomly arranged 0, 1600, 3070, or 4300 m altitude exposures for 30 min each on alternate days in an altitude chamber. The brain wave spectrum of eye closed EEG (beta wave/alpha wave, alpha peak frequency, power of alpha peak/alpha power, and theta wave) was analyzed, and the performance in simple operation, meticulous operation, and in sharing of attention were tested during exposures. The results showed that the brain wave spectrum and meticulous operation performance deteriorate even during mild hypoxia. It is suggested that suitable oxygen supply to aircrew is essential to maintain their performance during flight.
Author (revised by AIAA)
Hypoxia; Electroencephalography; Brain; Psychomotor Performance; Neurophysiology

19980022160
Physiological reactions to cold air inhalation in healthy young men
Ren, Zhao-sheng, Chinese Air Force, Inst. of Aviation Medicine, China; Li, Wei, Chinese Air Force, Inst. of Aviation Medicine, China; Fu, Li-shen, Chinese Air Force, Inst. of Aviation Medicine, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 96-98; In Chinese; Copyright; Avail: Aeroplus Dispatch

The aim of this study is to explore the physiological effect of cold air inhalation on healthy young men and put forward the acceptable temperature of oxygen for pilots. In a low temperature chamber five male soldiers, with their whole bodies kept warm, inhaled cold air for 60 minutes through oxygen mask. Their physiological reactions, including skin temperature, respiratory parameters of small airway, ECG, blood pressure, and reaction of upper respiratory tract were observed. The results showed that inhalation of 3-12 C air did not produce any significant physiological reaction. When -2 to -7 C air was inhaled, skin temperature around the nose was slightly lowered; respiratory parameters and ECG did not changed significantly; the perception of coldness of inspired air was prominent; during the later half of the test, diastolic pressure and mean arterial blood pressure increased significantly; and there was some mucous nasal discharge in 2-3 subjects. The mechanisms of these physiological reactions are analyzed.
Author (revised by AIAA)
Cold Tolerance; Oxygen Breathing; Respiratory Physiology; Physiological Responses

19980022703 NASA Johnson Space Center, Houston, TX USA

Method for Reducing Pumping Damage to Blood

Bozeman, Richard J., Jr., Inventor, NASA Johnson Space Center, USA; Akkerman, James W., Inventor, NASA Johnson Space Center, USA; Aber, Gregory S., Inventor, NASA Johnson Space Center, USA; VanDamm, George Arthur, Inventor, NASA Johnson Space Center, USA; Bacak, James W., Inventor, NASA Johnson Space Center, USA; Svejkovsky, Robert J., Inventor, NASA Johnson Space Center, USA; Benkowski, Robert J., Inventor, NASA Johnson Space Center, USA; Oct. 21, 1997; 18p; In English; Division of US-Patent-Appl-SN-153595, filed 10 Nov. 1993

Patent Info.: Filed 26 May 1995; NASA-Case-MSC-22424-2; US-Patent-5,678,306; US-Patent-Appl-SN-451709; US-Patent-Appl-SN-153595; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Methods are provided for minimizing damage to blood in a blood pump wherein the blood pump comprises a plurality of pump components that may affect blood damage such as clearance between pump blades and housing, number of impeller blades, rounded or flat blade edges, variations in entrance angles of blades, impeller length, and the like. The process comprises selecting a plurality of pump components believed to affect blood damage such as those listed herein before. Construction variations for each of the plurality of pump components are then selected. The pump components and variations are preferably listed in a matrix for easy visual comparison of test results. Blood is circulated through a pump configuration to test each variation of each pump component. After each test, total blood damage is determined for the blood pump. Preferably each pump component variation is tested at least three times to provide statistical results and check consistency of results. The least hemolytic variation for each pump component is preferably selected as an optimized component. If no statistical difference as to blood damage is produced for a variation of a pump component, then the variation that provides preferred hydrodynamic performance is selected. to compare the variation of pump components such as impeller and stator blade geometries, the preferred embodiment of the invention uses a stereolithography technique for realizing complex shapes within a short time period.

Official Gazzette of the U.S. Patent and Trademark

Blood Pumps; Impellers

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19980019496 NASA Ames Research Center, Moffett Field, CA USA

Rotational and Translational Components of Motion Parallax: Observers' Sensitivity and Implications for Three-Dimensional Computer Graphics

Kaiser, Mary K., NASA Ames Research Center, USA; Montegut, Michael J., NASA Ames Research Center, USA; Proffitt, Dennis R., Virginia Univ., USA; Journal of Experimental Psychology; 1995; Volume 1, No. 4, pp. 321-331; In English

Report No.(s): NASA/TM-95-207260; NAS 1.15:207260; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The motion of objects during motion parallax can be decomposed into 2 observer-relative components: translation and rotation. The depth ratio of objects in the visual field is specified by the inverse ratio of their angular displacement (from translation) or equivalently by the inverse ratio of their rotations. Despite the equal mathematical status of these 2 information sources, it was predicted that observers would be far more sensitive to the translational than rotational component. Such a differential sensitivity is implicitly assumed by the computer graphics technique billboarding, in which 3-dimensional (3-D) objects are drawn as planar forms (i.e., billboards) maintained normal to the line of sight. In 3 experiments, observers were found to be consistently less sensitive to rotational anomalies. The implications of these findings for kinetic depth effect displays and billboarding techniques are discussed.

Author

Computer Graphics; Translational Motion; Parallax; Display Devices; Anomalies; Visual Fields

19980020628 Army Command and General Staff Coll., Fort Leavenworth, KS USA

AH-64D Longbow Helicopter Gunnery Training Strategy

Williams, John D., Army Command and General Staff Coll., USA; Jun. 06, 1997; 124p; In English

Report No.(s): AD-A331808; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This thesis in an assessment of attack helicopter gunnery training and the adequacy of that training as the Army fields the AH-64D Longbow attack helicopter starting in 1997. The problem confronted by this study is both institutional and unit gunnery training. This thesis is supported by an overview of the current helicopter gunnery training strategy and contains a history of the development of the attack helicopter, as well as the expectations of Aviation Branch in Force XXI. Finally, a comparison of capa-

bilities is conducted between the AH-64A and the AH-64D. The thesis draws several conclusions. First, the current helicopter gunnery training strategy is not acceptable for the Longbow. Second, the gunnery infrastructure is insufficient to assist commanders, analyze trends, and incorporate lessons learned. Third, the training aids and simulators available to the Longbow unit commander will likely be inadequate. The majority of the analysis in this thesis focuses on the human dimension of attack helicopter employment. Army aviators will continue to employ helicopters in combat through the foreseeable future; therefore, training should focus on preparing them for that combat and the uncertainty that will confront them. by focusing on technology, the importance of human strengths and weaknesses may be overlooked.
DTIC
Aircraft Pilots; Helicopters; Training Simulators; Training Devices

19980020960 Uniformed Services Univ. of the Health Sciences, Dept. of Psychiatry, Bethesda, MD USA
Administration, Scoring, and Procedures Manual for the DSMPTSD 3-R & DSMPTSD 4. A Measure of Posttraumatic Stress Disorder Structured to Meet DSM-3-R & DSM-4 Diagnostic Criteria ***Final Report***
Ursano, Robert J., Uniformed Services Univ. of the Health Sciences, USA; Fullerton, Carol S., Uniformed Services Univ. of the Health Sciences, USA; Nov. 1997; 27p; In English
Report No.(s): AD-A334297; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Since many trauma and disaster studies include the Impact of Events Scale (lES) and the SCL-9O-R as core instruments, the DSMPTSD-III-R has been developed to identify PTSD with the addition of only 12 Supplemental Items to these two scales. The DSMPTSD-III-R is structured to meet DSM-III-R and the DSMPTSD-IV is structured to meet DSM-IV diagnostic criteria for PTSD using a multimeasure approach. The DSMPTSD-III-R uses the SCL-9O-R, the Impact of Events Scale (lES), and 12 Supplemental Items scored similar to the SCL-9O-R to assess PTSD. By using a general measure, a disaster-specific measure, and Supplemental Items specific to PTSD, the dimensions of PTSD can be assessed in a more thorough manner than with only one measure. Through the lES, the DSMPTSD-III-R and DSMPTSD-IV retain trauma-specific symptoms of intrusion and avoidance.
DTIC
Disasters; Signs and Symptoms; Manuals

19980021233 Metrica, Inc., San Antonio, TX USA
Evaluating the Decision-Making Skills of General Aviation Pilots ***Final Report***
Driskill, W. E., Metrica, Inc., USA; Weissmuller, Johnny J., Metrica, Inc., USA; Quebe, John C., Metrica, Inc., USA; Hand, Darryl K., Metrica, Inc., USA; Hunter, David R., Federal Aviation Administration, USA; Feb. 1998; 52p; In English
Report No.(s): DOT/FAA/AM-98/7; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

An instrument consisting of 51 items was developed to assess pilot decision-making skill. Each item consisted of a stem, a short description of an aviation scenario requiring a decision on the part of the pilot. Four alternatives were provided, and subjects were instructed to rank order the alternatives from best to worst solution to the scenario presented. Rank-ordered judgments of a sample of 246 general aviation (GA) pilots (with an average of about 500 hours of total flying experience) were compared with the recommended solutions provided by an expert panel. Results indicated that, overall, GA pilots and an expert panel of pilots agreed in their judgments of the appropriate course of action in situations critical to flight safety. However, the degree of agreement of individual general aviation pilots with the recommended solutions varied widely. An index of agreement (Safety Deviation Index) was calculated that expressed the degree of agreement of individual GA pilots with the recommended solutions. Initial evaluation of this index indicates that it demonstrates adequate psychometric properties and that, as other research would suggest, it has little relationship with common demographic or flight experience measures.
Author
Decision Making; Flight Safety; Psychometrics; Judgments; General Aviation Aircraft

19980021239 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
An Analysis of the Effectiveness of Online Peer Feedback at the USA Air Force Academy
Driscoll, Annette M., Air Force Inst. of Tech., USA; Dec. 1997; 75p; In English
Report No.(s): AD-A335015; AFIT/GIR/LAS/97D-7; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This thesis explores the effectiveness of the Air Force Academy's Department of English local area network peer feedback system. Four main questions were examined. These questions explored: (1) whether students reported improvement in their writing; (2) whether students reported that feedback is worthwhile; (3) whether students reported that LAN sessions increase enjoyment of writing; and (4) what types of feedback the students received and found most helpful. Three groups were studied. Forty-six students received feedback online, fifty students received feedback face to face, and thirty-three students did not receive feedback. Comparisons were made for the questions mentioned above to see if there was any difference in the responses based on the method

of feedback the students received. The results of the study suggest that students' perceived writing improvement is not affected by the peer feedback program. Peer feedback is successful in that students who participate find it to be worthwhile and at least one group believes that it makes writing more enjoyable. Finally, the two feedback groups reported receiving and wanting different types of feedback. The online group receives and prefers feedback on content, and the face to face group receives and prefers feedback on flow.
DTIC
Computer Networks; Armed Forces (USA); Effectiveness; Feedback

19980021382 Ohio State Univ., Columbus, OH USA
An Evaluation of Pilot Acceptance of the Personal Minimums Training Program for Risk Management ***Final Report***
Jensen, Richard S., Ohio State Univ., USA; Guilkey, James E., Ohio State Univ., USA; Hunter, David R., Federal Aviation Administration, USA; Feb. 1998; 30p; In English
Contract(s)/Grant(s): DTFA01-92-10204; Proj. AM-A-94-189
Report No.(s): DOT/FAA/AM-98/6; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A new general aviation training program entitled, "Personal Minimums for Aviator Risk Management in Pre-Take-off Decisions" was field tested in five diverse geographic locations around the USA (Columbus, OH; Long Beach, CA; Anchorage, AL; Baltimore, MD/Washington, DC; and Chicago, IL) to determine its acceptability to pilot audiences and to obtain feedback for further development of the intervention. In each case, following the presentation, participants were asked to evaluate the course and its acceptability to the general aviation community. Analysis of these evaluations revealed that respondents viewed the training program as helpful and intended to use personal minimums as part of their pre-flight decision making in the future. Respondent comments and feedback from local FAA personnel at each of the field sites resulted in progressive modifications to the training format and presentation to improve its acceptance and utility throughout the course of the field test. It is recommended that development proceed with video and computer-based versions of this training program and that studies of the training impact be conducted, possibly in concert with the dissemination of the program throughout the FAA safety seminar program.
Author
Project Management; Decision Making; Computer Techniques; Safety; Education; General Aviation Aircraft

19980021434
A preliminary study on the relationships of anxiety trait to student pilots error rate in manipulation and their grounding rate
Guo, Xiao-chao, Chinese Air Force, Inst. of Aviation Medicine, China; Li, Liang-ming, Chinese Air Force, Inst. of Aviation Medicine, China; Ding, Ya-ping, Chinese Air Force, Inst. of Aviation Medicine, China; Chinese Journal of Aviation Medicine; Jun. 1993; ISSN 1001-6589; Volume 4, no. 2, pp. 93-95; In Chinese; Copyright; Avail: Aeroplus Dispatch

The relationships of anxiety trait score of state-trait anxiety inquiry (STAI) to the manipulation error rate and the grounding rate in flight training of student pilots were studied. It is found that the anxiety trait is indeed one of the personality traits influencing error rate and grounding rate. Generally speaking, those student pilots with their anxiety trait score on the high or low side are more likely to have more manipulation error and get final grounding in flight training. The ones who have medium scores of anxiety trait in STAI are prone to have fewer such failures. That is, a U-shaped curve between failures versus anxiety trait score. The optimal levels of their anxiety trait, according to present study, should be 28-39 in STAI. In conclusion, the anxiety trait should be considered in pilot selection.
Author (revised by AIAA)
Pilot Error; Anxiety; Psychological Factors; Personality Tests; Pilot Selection

19980021829
Observer-based controllers for nonlinear systems
Raghavan, Sekhar, California Univ., Berkeley, USA; Hedrick, J. K., California Univ., Berkeley; 1992, pp. 49-56; In English; Copyright; Avail: Aeroplus Dispatch

In this paper, we address the problem of how to efficiently use estimates from a stable observer in a state-feedback control law when all of the states are not measurable. We propose a new design technique to construct observer-based controllers for nonlinear systems and prove its stability for feedback linearization and sliding control methods. We address the performance-degrading peaking effect which results when the observer estimates are directly used in the control law, and show that our technique

improves performance over a traditional implementation. Finally, we illustrate our theory in the control of a single-link flexible joint robot.
Author (AIAA)
Nonlinear Equations; Controllers; Feedback Control; Control Systems Design

19980021832
Conditional logistic regression analysis of the personality traits in pilots with neurasthenia
Dong, Yan, Chinese Air Force, China; Miao, Dan-min, Chinese Air Force, China; Mai, Shuang-hou, Chinese Air Force, China; Chinese Journal of Aviation Medicine; Sep. 1993; ISSN 1001-6589; Volume 4, no. 3, pp. 154-156; In Chinese; Copyright; Avail: Aeroplus Dispatch

The methods of the unifactor analysis and the multiple factor conditional logistic regression analysis were applied to investigate personality traits in 52 pilots with neurasthenia and 49 healthy pilots as controls. The results indicate that the method of multiple factor conditional logistic regression analysis is the method of choice to make the principal personality traits stand out discriminating the patients from the controls, while the personality traits were relatively dispersed in unifactor analysis. The study also showed that the neurasthenic pilots have a special personality characteristic, and a discussion of the relation between the characteristic traits and neurasthenic patients follows.
Author (revised by AIAA)
Aircraft Pilots; Personality; Pilot Selection; Aviation Psychology; Neurasthenia

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19980020252 New York Univ. Medical Center, Occupational and Industrial Orthopaedic Center, New York, NY USA
Effect of Load Asymmetry on Internal Loading of the Trunk *Final Report*
Sheikhzadeh, A., New York Univ. Medical Center, USA; Nov. 1996; 222p; In English
Contract(s)/Grant(s): NIOSH-5-R03-OH03087-02
Report No.(s): PB98-115926; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

The effects of changes in the magnitude and angle of the net resultant force on the electromyographic (EMG) activity of trunk muscles, and the forces acting on the lumbar spine during upright asymmetric isometric trunk exertion were evaluated. The activities of ten trunk muscles were quantified using wire and surface EMG during maximal and submaximal isometric exertion. Subjects included 15 healthy volunteers, mean age 29.8 years. Muscle parameters were calculated from computed tomography images. The normalized root mean square (NRMS) EMG of the trunk muscles were affected by trunk movement magnitude and angle. An EMG driven model of lumbar spine load was used to calculate compression and shear forces. The author concludes that the selected trunk muscles were significantly affected by the magnitude and direction of the net resultant moment. The NRMS-EMG activity of the trunk muscles was magnitude and direction of the net resultant moment. The NRMS-EMG activity of the trunk muscles was magnitude and direction of the net resultant moment. The NRMS-EMG activity of the trunk muscles was higher during combined (asymmetric) isometric exertion compared to pure (symmetric) isometric trunk exertion. The controllability and capability of high magnitude trunk moments were significantly affected by the direction of the net resultant moment. The results may have special applications for ergonomic job evaluation and job design. The author recommends that repetitive tasks involving asymmetric trunk postures should be avoided as should the combination of lexion and twisting of the trunk.
NTIS
Lumbar Region; Human Factors Engineering; Posture; Loads (Forces); Physiological Tests; Physiological Effects

19980020635 Naval Postgraduate School, Monterey, CA USA
A Computer Simulation Study and Component Evaluation for a Quaternion Filter for Sourceless Tracking of Human Limb Segment Motion
Henault, German A., Naval Postgraduate School, USA; Mar. 1997; 105p; In English
Report No.(s): AD-A331813; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Current methods of tracking the human body within virtual environments (VE) are hampered by problems due to interference which occurs from using artificially generated source signals. In recent years, the miniaturization of self-contained inertial tracking systems has made them a viable alternative. They are impervious to external interference but require filtering in order to give

accurate orientation data. Filters for this purpose using Euler angles are common, but are limited by their inability to track through the vertical axis. A filter based on quaternions would not have this limitation. This thesis presents an implementation of a quaternion filter in Lisp. The filter was tested with a computer simulated inertial tracker. Also presented is a quantitative and qualitative assessment of an existing inertial tracker, Angularis, which uses a filter based on Euler angles. This effort resulted in an improved filter based on quaternions which allows objects to be tracked through the vertical axis making it a more desirable option for body tracking applications. The evaluation of the Angularis inertial tracker yielded generally good results when tested on a tilt-table at various rates of motion through 45 degrees of rotation. Specifically, orientation errors measured were typically less than one degree for smooth motion. However, when moved rapidly through large orientation angles, it was found that the nonlinear characteristic of the proprietary filter resulted in large steady state errors.
DTIC
Computerized Simulation; Human Body; Quaternions; Human Factors Engineering; Virtual Reality; Human-Computer Interface

19980020956 Microbial Insights, Inc., Rockford, TN USA
Rapid System to Quantitatively Characterize the Airborne Microbial Community ***Final Report No. 8, Mar. 1996 - Feb. 1998***
Macnaughton, Sarah J., Microbial Insights, Inc., USA; Feb. 26, 1998; 32p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS9-19531
Report No.(s): NASA/CR-1998-207474; NAS 1.26:207474; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Bioaerosols have been linked to a wide range of different allergies and respiratory illnesses. Currently, microorganism culture is the most commonly used method for exposure assessment. Such culture techniques, however, generally fail to detect between 90-99% of the actual viable biomass. Consequently, an unbiased technique for detecting airborne microorganisms is essential. In this Phase II proposal, a portable air sampling device his been developed for the collection of airborne microbial biomass from indoor (and outdoor) environments. Methods were evaluated for extracting and identifying lipids that provide information on indoor air microbial biomass, and automation of these procedures was investigated. Also, techniques to automate the extraction of DNA were explored.
Derived from text
Air Sampling; Aerosols; Microorganisms; Extraction; Culture Techniques; Allergic Diseases

19980021218 NERAC, Inc., Tolland, CT USA
Anthropometry: Basic Studies and Applications. (Latest citations from the NTIS Bibliographic Database)
Jan. 1998; In English; Page count unavailable.
Report No.(s): PB98-852114; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the utilization of anthropomorphic measurement techniques in the design of military and civilian clothing and equipment. Topics include motion studies, physical fitness surveys, the use of anatomical models, and gender comparisons pertaining to specific anthropometric variables. Aircraft seats and cabins, cockpit design, automobile safety equipment, and flotation devices are among the equipment types considered. Military and civilian population surveys, and recreational products are also discussed. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Anthropometry; Clothing

19980021227 NERAC, Inc., Tolland, CT USA
Anthropometry in the Design of Protective Equipment. (Latest citations from the NTIS Bibliographic Database)
Jan. 1998; In English; Page count unavailable.
Report No.(s): PB98-852197; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the utilization of anthropometric measurement techniques in the design and evaluation of protective equipment. Anthropometric measurement in the design and evaluation of helmets, gloves, clothing for air crews, interrelationships between clothing size and cockpit design in aircraft and tanks, restraint system designs including lap belts and harnesses, respirators, airbag restraints, and devices to protect automobile drivers from side impact accidents are among the topics discussed.(Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Anthropometry; Safety Devices

19980021228 NERAC, Inc., Tolland, CT USA

Carpal Tunnel Syndrome and Other Repetitive Motion Disorders. (Latest citations from the NTIS Bibliographic Database)

Jan. 1998; In English; Page count unavailable.

Report No.(s): PB98-852148; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography (contains 50-250 citations and includes a subject term index and title list) contains citations concerning the prevention of carpal tunnel syndrome and other repetitive motion injuries. Citations focus on risk factors and biomechanics associated with the disorders. Ergonomics, work habits, and case studies are covered. The citations also examine Health Hazard Evaluation Reports and videos describing preventive strategies.

NTIS

Bibliographies; Biodynamics; Human Factors Engineering; Health

19980022401

Supervisory control in a dynamic and uncertain environment - Laboratory task and crew performance

Kirlik, Alex, Georgia Inst. of Technology, Atlanta, USA; Plamondon, Brian D., Martin-Marietta Corp., USA; Lytton, Lynn, Texas Univ., Austin; Jagacinski, Richard J., Ohio State Univ., Columbus; Miller, R. A., Ohio State Univ., Columbus; IEEE Transactions on Systems, Man, and Cybernetics; Aug. 1993; ISSN 0018-9472; Volume 23, no. 4, pp. 1130-1138; In English

Contract(s)/Grant(s): NAG2-195; Copyright; Avail: Aeroplus Dispatch

A research program using a microworld methodology for investigating human performance in a dynamic uncertain environment is described. One- and two-person crews performed a supervisory control task that involved piloting a low-fidelity scout helicopter and supervising four additional helicopters. The simulated environment contained cargo and enemy craft that had to be discovered by searching a 100 sq mile forested region. The task required planning, intervention, and several types of resource management. An expert one-person crew performed comparably to novice two-person crews, and both of these were superior to novice one-person crews. More detailed analyses of performance revealed several types of limited adaptivity in the behavior of the novice crews.

Author (revised by AIAA)

Human Performance; Automatic Control; Man Machine Systems; Flight Crews; Radar Targets

19980022862

Supervisory control in a dynamic and uncertain environment - A process model of skilled human-environment interaction

Kirlik, Alex, Georgia Inst. of Technology, Atlanta, USA; Miller, R. A., Ohio State Univ., Columbus; Jagacinski, Richard J., Ohio State Univ., Columbus; IEEE Transactions on Systems, Man, and Cybernetics; Aug. 1993; ISSN 0018-9472; Volume 23, no. 4, pp. 929-952; In English

Contract(s)/Grant(s): NAG2-195; Copyright; Avail: Aeroplus Dispatch

A process model of skilled human interaction with a dynamic and uncertain environment is presented. The model was able to mimic human behavior in a laboratory task requiring one- and two-person crews to direct the activities of a fleet of agents to locate and process valued objects in a simulated world. The process model is a pair of highly interactive components that together mimic the behavior of the human-environment system. One component is a representation of the external environment as a dynamically changing set of opportunities for action. The second component is a dynamic representation of skilled human decisionmaking and planning behavior within the environment so described. Modeling both human and environment in an integrated fashion allowed for a description of behavior as being mutually influenced by the external environmental structure and an internal priority structure over available actions.

Author (revised by AIAA)

Human Behavior; Man Environment Interactions; Man Machine Systems; Crews; Cognition; Human Performance

Subject Term Index

Personal Author Index

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Z

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